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ABSTRACT

This report begins with an introduction to the main features of computer-mediated communication, concentrating on the use of computer conferencing for collaborative and group work. Twelve case studies on the use of computer conferencing in the academic environment are then presented and analyzed, with attention being given to both positive and negative factors influencing the implementation and use of this technology. Three main application areas are covered: administration, academic collaboration, and teaching. Consideration is also given to the use of computer conferencing for social networking. Referring back to the case studies, the concluding section identifies four key areas that must be attended to for successful use of computer conferencing: access to the technology, user support, induction of novice users, and conference moderation. (23 references) GL)

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Computer Conferencing in the Academic Environment

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COMPUTER CONFERENCING IN THE ACADEMIC ENVIRONMENT

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Abstract

The authors introduce the main features of computer-mediated communication, concentrating on the use of computer conferencing for collaborative and group work. Twelve case-studies of the use of computer conferencing in the academic environment are then presented and analysed, with attention being given to both positive and negative factors influencing the implementation and the use of this technology. Three main application areas are covered: administration, academic collaboration, and teaching. Consideration is also given to the use of computer conferencing for social networking. A concluding section, referring back to the case-studies, identifies four key areas which must be attended to for successful use of computer conferencing: access to the technology, user support, induction of novice users, and conference moderation.

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1. FEATURES OF COMPUTER-MEDIATED COMMUNICATION

1.1. Introduction

The use of computer-mediated communication (CMC) in both traditional and distance education institutions is growing rapidly in a number of countries. The adoption of this new educational environment raises a number of important issues, which we attempt to identify and address in this paper. These issues include the following:

•why are educators being asked to learn new skills and a new medium to accomplish what they have always done: teaching, learning, collaborating and communicating?

• why is computer conferencing being increasingly viewed as a technology with much to offer educational institutions?

• what does CMC provide that can complement, or in some cases supplant, traditional communication channels such as voice, print and telephone?

This report presents a case for using CMC by examining four areas of academic life in which it can make significant contributions, namely administration, academic collaboration, teaching, and social networking. Each of these areas is explored through discussion and analysis of a number of actual applications of computer conferencing at various institutions, some successful, some not so, but all with a view to generalising the lessons learned. Before turning to these specific applications, however, there are a number of general issues concerning the educational use of CMC which need to be identified.

1.2 The computer as a tool for education and communication

The traditional uses of computers in education have so far largely focussed on computer-assisted learning (CAL), which is based on packaged software on a particular educational topic. In CAL, the computer is programmed to respond to the user's actions. Simulation, modelling, self-testing, and intelligent tutoring techniques can all be brought into play in the design of CAL material. There is no doubt that such interactive CAL software has significant potential for the teaching of new and difficult concepts, especially with the new generation of authoring software which can make it easier for teachers to produce their own material. However, CAL material is still difficult, expensive, and time-consuming to develop, and there is a paucity of good material available in many discipline areas.

One reason why CMC appeals to a growing number of educators is that the interaction involved in conferencing is communication with actual people - fellow students, teachers, resource people, advisors etc - rather than only with instructional software. In many cases, it can be more economical, and more worthwhile educationally, to use computers as communication tools for group-based learning, rather than as repositories of CAL software (see, e.g. Bates, 1986).

Computer conferencing enables ongoing interactive dialogue among users: this may be on a specific topic related to a course activity, on an informal basis on a subject of common interest, or even on a topic quite different from that initially envisaged. The

computer thus becomes a vehicle for human communication and for the creation of networks of help, information and communal research, as opposed to a pre-programmed resource.

These two approaches to the use of computers in education - CAL and CMC - should not, however, be seen as mutually exclusive. There is a strong case to be made for combining the use of computer-mediated communication (both electronic mail and conferencing) with other computer-based resources such as CAL and data-bases, whether the latter are made available on-line, or locally on disk or CD-ROM. For example, on-line class discussion with other learners and with human tutors can be effectively integrated into the educational use of CAL, and CMC can be used as a tool for academic collaboration in the development of CAL material and the collation and discussion of information to be entered in data-bases.

1.3 Characteristics of CMC Systems

Most CMC systems provide an integrated range of facilities. These generally include:
- electronic mail for one-to-one communication
- one or more forms of asynchronous group communication (conferences)
- a 'chat' mode for real-time exchange of short messages with other users
- a directory of all users, with their resumés and information on when they last accessed the system
- a directory of all listed conferences, with brief details of each one
- an on-line editor and 'scratchpad' for message composition
- facilities for file uploads and downloads.

In addition, some of the more sophisticated systems include a range of special features such as :
- voting/polling options
- 'library' areas for storage of reference texts and (eg) course readings
- the possibility of tailoring commands and options to the needs of specific groups of users.

Some of the above features can be described with reference to the CoSy system, which is illustrated by analogy to a writer's desktop in Figure 1 *(A Metaphor for CoSy)*.

The 'scratchpad' on CoSy is an area where messages can be composed and edited on-line, and through which messages prepared off-line pass on the way to their ultimate destination (the user can intercept them at this point and add a PS or make amendments if desired).

The electronic mail facility on CoSy has three principal areas: an in-tray which holds incoming mail until it is read, a hold-tray for storing messages that have been read and not deleted, and an out-try which lists outgoing messages until they are read and deleted by the recipient. Individual mail messages can be forwarded to other users, or transferred into conversations. Mail can be sent to distribution lists as well as to individuals (the Open University's CoSy mail system has been modified to enable a mail message to be sent to up to 1500 recipients at once - this is used for an initial welcome message when students first log on to the system).

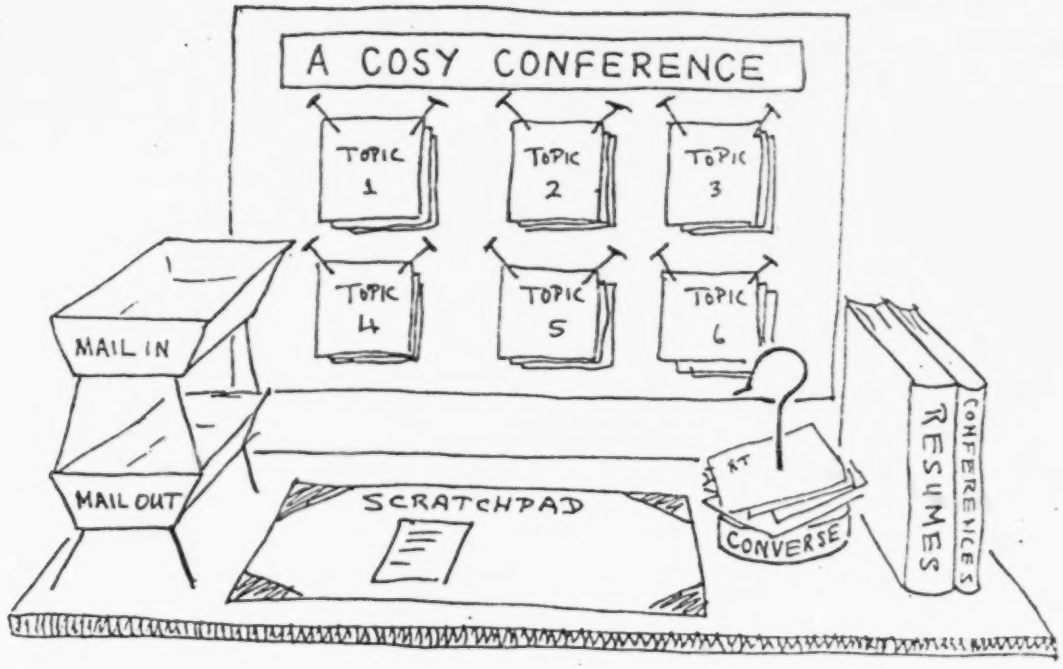

Figure 1: A Metaphor for CoSy
(courtesy of Ray Thomas, Open University)

CoSy provides two different areas for group communication: conversations and conferences. The conversation area is an unlisted, unstructured discussion area for small, informal groupings. The analogy for this 'space' is the conversation in the corridor or cafeteria queue, which others might be drawn into, but is generally intimate and short-lived. The conference area has many more facilities to allow interchange among any number of participants. It can be structured into different topics and accessed through a search procedure based on author or keyword. In addition, CoSy allows two forms of contribution - either a new message, or a comment on a preceding one. Consequently, a conference may be read in the chronological order in which messages were added, or the reader may choose to follow the logical comment connections, that is, by reading all comments which refer to a particular point. For both conversations and conference topics, CoSy keeps a record of which message each user has read, and a 'pointer' automatically puts users, on joining a conference topic, into the first unread message. It is possible for any member of a conference to check when the other members last 'visited' a specific conference. Like most conferencing systems, CoSy provides a range of access levels. Conferences may be open to any member on the system, or closed and accessible only with the permission of the conference creator.

Confidential conferences are even more private in that their existence is not indicated in CoSy's public directory of conferences.

Figure 2 shows part of a typical conference message, with an associated comment. Like all messages, they are identified with a header containing the author's name, the message number, the date and time of creation, and the length in characters.

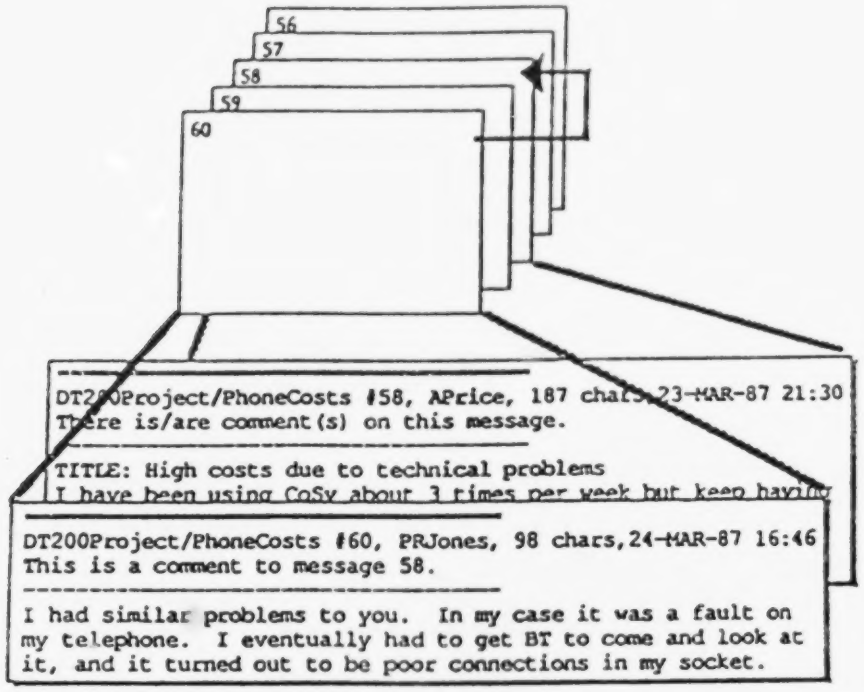
56
57
58
59
60
DT200Project/PhoneCosts #58, APrice, 187 chars, 23-MAR-87 21:30
There is/are comment(s) on this message.
TITLE: High costs due to technical problems
I have been using CoSy about 3 times per week but keep having
DT200Project/PhoneCosts #60, PRJones, 98 chars, 24-MAR-87 16:46
This is a comment to message 58.
I had similar problems to you. In my case it was a fault on my telephone. I eventually had to get BT to come and look at it, and it turned out to be poor connections in my socket.

Figure 2: Examples of CoSy Messages

There is a directory of all non-confidential conferences on CoSy, with a brief description of each conference and an indication of its status ('open' or 'closed'). This directory is searchable (eg the command *show all physics* will produce the full titles of any conferences with the string *physics* in the title or descriptor). It is also possible to obtain further details about a conference with a simple command which then shows the name of the moderator, when the conference was set up, and what topics it contains.

Finally, CoSy has a number of facilities to enable users to find out about other participants. There is a command for discovering who else is on-line at the same time as oneself, and another command for tracing an individual's ID (eg the command *show mary* will list all the ID's containing the string *mary*). Every user of CoSy can put onto the system a resumé, with personal and other details to which she or he wants other users to have access. Resumés can be changed or updated at will, and can be short or long. This is a very valuable feature for discovering other users with similar interests, and for encouraging the development of social support networks.

1.4 Conferencing and electronic mail

An important issue in understanding computer communication is to recognize its two major components - computer conferencing and electronic mail - as complementary, rather than competing, features. Each facilitates an essential but distinct and complementary aspect of human communication.

Electronic mail is a medium well understood and employed by many in educational institutions: it is a one-to-one (personal) or one-to-many (broadcast) mode of communication. It fulfills the same function as postal mail, but with greater speed; it has many of the advantages of a telephone call, but none of the frustrations of telephone tag. However, electronic mail simply provides electronic delivery of memos or letters - an individual types in a message for collection by the recipient(s). Senders and recipients of email messages are left with the task of dealing with the messages : deciding whether or not to delete them, to file them, and if so how and where. Anyone who has tried using the *copy* facility in email systems to carry out group communication knows that it only takes a few exchanges to end up with a vast number of messages on the group task topic, interspersed with other, totally unrelated messages, all of which have to be sorted by the users. And each user often sets up different sorting and filing criteria and procedures, which further complicates the group collaboration process. The bulletin board facility of many email systems can be used to remedy some of these problems, but it is usually tailored more for broadcasting of information and messages than for active group collaboration.

Computer conferencing software, on the other hand, is essentially a group communication medium. It provides a much richer environment than email, where complex interactions among a group of people can be created, stored, accessed, and searched at any time and from any location. The organisation and filing structure of a conference is set up by the conference moderator, tailored to the needs of the group and the nature of the task, and stored within the system. Furthermore, a number of different conferences can be held simultaneously, each serving a different purpose, and each stored in its own place on the system. Electronic mail and bulletin boards do not permit this kind of multi-layered group communication.

As mentioned earlier, it should be stressed that computer conferencing is not a substitute for electronic mail. All CMC software systems include email facilities for personal and one-to-one communication, and their functionality would be seriously diminished without email. Computer conferencing and email are complementary media.

1.5 Independence of time and place

The most obvious advantage of computer conferencing, other than the use of the computer to file and organisation communications, is the freedom it provides for users to communicate at a time or place convenient to them. Time independence refers to the fact that communication within most CMC systems is based upon asynchronous (that is, not real-time) communication. Unlike face-to-face or telephone interaction, which are real-time, conferencing messages are stored in the central computer database where they await access by the addressee(s). One implication of this 'asynchronicity' is that participants in a computer conferencing discussion can devote more time to reflection about, and preparation of, their contributions, than is possible in a face-to-face discussion or an audio-teleconference. This time for reflection and preparation can lead to a more considered and fruitful discussion. It also highlights the need for message searching, commenting, and linking facilities in the computer conferencing software, to overcome the difficulties of dealing with a number of different 'threads' of discussion running through a conference, and the disjointed nature which some conference discussions demonstrate if members are logging on at different intervals and frequencies.

1.6 De-personalising human interaction?

It might seem to the uninitiated that communicating via a computer represents a drastic step towards the de-personalising of human communication. However, experienced users of this medium deny that it obstructs personal interaction. In fact, one of the strangest and most compelling aspects of conferencing is that one's fellow participants seem, if not tangible, certainly very alive, recognisable, multi-dimensional personalities. Furthermore, the unplanned, unpredictable nature of conferencing offers many users the excitement, stimulation and pleasure of meeting new people and new ideas. Andrew Feenberg has pointed out that ..." *the strangest thing about CMC is not its purported inhumanity, but rather its lively, rapid iterations, almost rapid enough to recall spoken conversation. The speed with which messages are exchanged makes it possible to use computer communications to manage a project, say, or teach a class, or meet new people. With practice, the computerised mediation of such pursuits comes to be seen as a normal part of daily life.*" (Feenberg, 1989: 23). There is no doubt that in France, the only country in the world with a widely available public computer communication system (the *Télétel* system is now accessible from over four million homes via loaned Minitel terminals), electronic "chatting" services have become extremely popular, and are not perceived as de-personalising - on the contrary (see Marchand, 1988).

In on-line courses, students report that computer conferencing enables more opportunities to get to know learning peers than typically available in face-to-face graduate classes and seminars: *"It has been very interesting to take a traditional course alongside this one. I have noticed that the time I spend interacting with students in my other class is severely limited. I have also noticed that there is a protocol observed to varying degrees in the classroom that directs all communication through the teacher. It is considered rude to ignore the teacher and discuss a particular point with another student. The result has been that I do not know the other students in that class very well... I think that this [computer conferencing] system is wonderful for*

communication and I can add that there is a lot more communication here than I can find in my on-site course. Also I feel a greater sense of cooperation within this [on-line] group." (cited in Harasim, 1987: 126-127)

1.7 Conferencing as a tool for education and collaboration

Computer conferencing is a unique medium for educational purposes as it combines two characteristics particularly relevant to teaching, learning, and collaborating:

- it is a medium of written discourse, which shares some of the spontaneity and flexibility of spoken conversation, and many of the advantages of a written record developing over time
- it is inherently interactive and as such is a powerful tool for group communication and cooperative learning.

Computer conferencing facilitates the processes of internal reflection and re-organisation through dialogue, argument and debate. It reinforces the skills of analysis and written expression using the language of the discipline. Computer conferencing vastly increases the opportunities for taking turns at expressing one's ideas and for receiving more feedback on them from a wider variety of people, and in a format which is easily retrievable (unlike audio-conferencing). Growing out of this high level of interaction and permanence of the discussion record is the possibility of group creation, where people make leaps in understanding which are unlikely to happen when working in isolation.

1.7 A medium of integration not substitution

Although computer conferencing has been used successfully as the sole medium for teaching, organising, socialising or communicating, it is more often used to complement other forms of contact and even to integrate a range of communication and learning media. Conferencing tends to encourage people to communicate by whatever means available, and many of the applications to be discussed below involve the use of conferencing as part of a multi-media communication system. Conferencing can be exploited to reduce the frustration of telephoning, to overcome the slowness of postal mail and to increase the productivity of face-to-face meetings; it works best in conjunction with other media, not as a complete substitute for them.

1.9 The current state of the technology

There are at least four factors to take into account in an analysis of the technological basis of CMC: the CMC software itself, the environment of the host machine(s), the user's workstation and software, and the telecommunications links. The picture is complicated by the fact that all four of these areas are 'moving targets' at the moment, and are liable to remain so for some time to come.

The current generation of conferencing software (eg CoSy, EIES, Participate, CAUCUS, eForum, CONFER etc), often initially designed for use over dumb terminals and/or with personal computers operating in terminal emulation mode, and able only to deal with ASCII text files, now appears very limited in the age of icons, hypertext, and computer graphics. A new generation of conferencing software is under

development (eg TEIES) able to handle graphics, and tailorable to different types of group task. Major research projects currently underway (eg the Alvey-funded COSMOS project in the UK) and developments in CSCW research are likely to result in further enhancements to commercially available software in the next five years or so. Apart from the functionality of the software itself, a further important factor is whether the software is available in a distributed version, or whether, as is the case with most systems at the moment, all users are obliged to log on to a single central machine to access their conference and mail messages. Another issue of great importance concerns the compatibility of the system with the X400 electronic messaging standards, and whether, for example, mail messages can be routed transparently in and out of the conferencing system to external mail systems.

The issues of interoperability and compatibility are also important when there are several different email and communication systems running in the environment of the host machine(s). It is no longer reasonable to expect users to have to log on to several different systems to collect waiting messages, yet this is just what is happening at the moment on many university campuses (eg at the British Open University, central academic staff can have access to two different conferencing systems, and at least three different email systems - each of which has to be accessed separately).

The processing power of the host machine(s) is another important factor in acceptability of a conferencing system - especially for centralised systems with many users (for example, the EIES system at New Jersey Institute of Technology can be notoriously slow at peak usage times).

As micro-computers have become less expensive and more powerful, and are being used more and more for telecommunications as well as for stand-alone applications, so there have been recent initiatives to develop 'front ends' to conferencing systems. These use the local processing power of the computer and its software to handle automatic logon and retrieval of unread messages, and even local, interactive, replication of the conferencing system structure (eg in hypercard stacks). The Open University, for example, has developed a menu-driven front-end to CoSy for MSDOS machines (OUCom) as well as a hypertext-based prototype for the Apple Macintosh environment (HyperCoSy). The Western Behavioral Sciences Institute has developed a front-end to EIES (PassKey) for executives participating in its on-line management studies program. The Participate developers are designing a HyperCard frontend, entitled MACParti. And the Thoughtbox project at the Open University is developing a prototype for a tailor-made workstation for distance learners, which will combine local CAL software, creative tools, audio, and remote communications within an integrated environment (Alexander and Lincoln, 1989). One of the important features of the Thoughtbox project is a built-in 2400 baud modem and automatic and rapid capture of waiting messages from the conferencing system, with a view to reducing users' on-line communication costs.

The keeping of user connect costs to the minimum level is a major factor in determining uptake and usage of conferencing systems. These costs depend to a large extent on local tariff rates and the extent and availability of packet-switching services.

2 CMC AS AN ADMINISTRATIVE TOOL

2.1 Introduction

Computer conferencing was originally developed to meet the needs of governments for a more effective group communications media to deal with national and international crises. In short, it grew from the need for communication amongst a distributed group of people.

The value of a computer conferencing system in a university or college environment is based on three premises:
- in our information society, a university is a 'knowledge-producing industry'
- virtually all types of production are improved through synergy - the value added by working in interaction
- synergy comes about through successful communication.

CMC has been used administratively in a number of ways - to increase efficiency and productivity, to aid decision-making and to coordinate effectively a dispersed group of co-workers. Roxanne Hiltz, who has studied the uses of computer conferencing in organisations says: " *Communication is the fundamental process by which interaction among the elements of a human system takes place; it is the exchange process by which goals are formulated, decisions made, and 'work' accomplished. It is inevitable that changing the form of communication used by the members of a group will affect the goals, interactions, cohesion, productivity, etc. of that group, and their relationship with the rest of society .*" (Hiltz and Turoff, 1978: 258).

Four very different settings are the subjects of the case studies presented here to show the impact of computer conferencing in the administration of organisations. The first is the use of CoSy by a highly dispersed group in the Highlands and Islands of Scotland, known as Rurtel. The second is a more detailed study of Guelph University, the originator of CoSy, and the third is a well documented account of the success and failures of introducing a conferencing system into a large, distributed drug company. The final example is a pilot study of the use of conferencing by the Ontarian Ministry of Community and Social Services.

2.2 Rurtel, Scotland

Rurtel provides the CoSy conferencing system to voluntary, educational and research groups in remote parts of Scotland. By special arrangement with British Telecom, all users have local call access. The primary administrative value of conferencing is amongst the various management committee members. They find conferencing invaluable for discussing up-coming issues and preparing agendas of forthcoming face-to-face meetings. Computer conferencing allows controversial subjects to be aired and gives everyone a chance to contribute and express their views in a careful, considered form. Consequently, the value of costly, infrequent face-to-face meetings is much enhanced and discussion is usually more productive. In some cases, it has been used to provide background material and generally assure that all participants are at the same level of preparedness.

Furthermore, expert advice can be solicited from individuals who would not normally attend the meeting. The on-line discussion creates a collective memory for the conference participants, and the information remains easily available for reference or for briefing new members on previous activity.

The Arkelton Trust is one of a number of organisations which make use of Rurtel. The Trust is primarily a research group looking into the training needs of people living in remote communities. Members work out many of their ideas in conferences, using CoSy for brainstorming, setting goals and objectives, and for liasing on a day-to-day basis. One particular example of this was a questionnaire which members generated entirely on-line with greater efficiency than would have been possible by mail or telephone, and with less disruption than a face-to-face meeting would entail. Because members log on everyday, the organisation has an everpresent meeting place despite their decentralised situation. The chief organiser of the project commented that: *"the Trust simply couldn't function without computer conferencing"*. Not only does the organisation function with a very small central staff, but the dispersed staff, many of them part-time or voluntary, still feel part of the whole group.

The Rurtel example shows how computer conferencing enables organisations to be very decentralised, while at the same time providing centralised control over dispersed elements.

2.3 The University of Guelph, Ontario

Guelph University has been using CoSy for five years, and though by no means all staff have access to a terminal or PC, the campus has been rewired with a digital phone system which can accommodate two voice lines, bridgeable for tele-conferencing, and a data line flowing through the sender/receiver concurrently. The organisational impact of computer conferencing has recently been the subject of a study by Elaine McCreary of the University's Department of Extension Studies (McCreary, 1989). She begins her report by acknowledging that the uptake of CoSy has not been pervasive, and that there continue to be three constituencies of people at Guelph:

- those who can always be reached on CoSy,
- those who use it sporadically
- those who have yet to be touched by it.

One of the most successful administrative applications of CoSy has been in the library, a leader in information technology. There, virtually everyone above supervisory level conducts part of their workday on-line. One member of staff, an inveterate traveller on University business, continues to communicate with his staff and carry out his normal duties from any part of the world. As in the Rurtel example, a major benefit of CoSy is in planning and preparation tasks. It has proved most useful as a complement to face-to-face meetings, being used for setting the agenda, negotiating the priority of business, and taking time in advance to consider options.

The consensus at the University of Guelph is that while meetings are now fewer, and shorter, communication in general is better because it is so very easy and convenient and because both formal and casual but productive discussions are much more

numerous than they were previously (Gillham, 1986). Sometimes CoSy has been used to attain closure on a choice of action, which is then simply reviewed in face-to-face meetings; sometimes it is used as a follow-up to meetings to confirm what has been decided.

McCreary gives other examples of unexpected uses of conferencing: even with relatively simple responsibilites for maintenance tasks in the library (such as repairing photocopiers, terminals, and CD-ROM players), what began as a use of CoSy to deploy repair staff by putting their work orders on-line, unintentionally grew into a way of automatically monitoring equipment to see which machines needed to be serviced most often, and whether the rate was excessive (p 105). She also describes how CoSy enabled more effective use of short-term working groups. Conferencing makes it possible to mobilise a committee or work group by sounding out potentially interested and suitable people without the need for lengthy background memos. The group then uses CoSy to delegate parts of the problem and inform the others of findings. *"Such groups also illustrate the strategic use of unofficial information systems, because they can consult via CoSy, inviting comment and opinion (more like taking a straw vote than asking people for formal statements of their position)"* (p 106).

McCreary's report covers the difficulties and upsets involved with introducing computer conferencing into a university setting. The first of these is the question of status differences. Computer conferencing has been shown to lead to a levelling of status in certain circumstances, as the lack of visual and status clues inherent in the medium leads to a greater focus on the content of the message. McCreary notes that some senior managers do participate in open conferences where they mix with staff and students, occasionally asking questions and receiving tips, information or opinions in an apparently equal status manner, usually because the respondent is not aware of the manager's hierarchical position. Other people with seniority, however, have expressed the feeling that they should be absent so as not to inhibit conference participants.

The second area of controversy involves changes in roles and expectations. At Guelph, the use of computer conferencing has led to additional roles: an Executive Director for Information Technology, to orchestrate the tremendously complex system transformation taking place, and a Diffusion Manager, to provide the non-technical support needed to promote adoption. Unfortunately, some faculty are complaining about the expectations placed on them to adopt technologies when the accountability procedures with their administrators do not adequately acknowledge the new form of invisible work, the time it entails, and inequities in teaching effort. However, academic and other administrative middle managers are discovering that there are now higher expectations of cooperation among working groups. *"People who need decisions taken within tight deadlines, and have been thwarted by non-cooperative colleagues, are finding that they can carve new, de facto, permision pathways around the difficulty by using CoSy"* (p 105).

Recommendations from the Guelph experience for implementing successful administrative uses of computer conferencing are the following:

- access to the terminal or PC must be as close to each user as the telephone
- every individual who would normally be a part of the communication network must

be an active participant of the conferencing system
• training and introduction to the system must be careful, complete and include a hands-on session, in order to overcome initial reservations or inhibitions
• the secret to successful electronic administrative communication is frequent, regular system use by all participants.

2.4 "DrugCorp"

The intensive study of this company (the name was changed to a fictitious one to protect confidentiality) by Shoshana Zuboff over a number of years has produced a report of considerable depth and insight (Zuboff, 1988). The introduction of the conferencing system, DIALOG, into this large, distributed company was mainly instigated by the management of the R&D department. Zuboff notes that the managerial and professional sectors of this corporation were known for their formality and respect for the chain of command.

The DIALOG system provided a new kind of access to people and places. Participants used the system to extend their communication networks beyond the group of acquaintances to which they otherwise might have been restricted. People who had never seen each other formed close working relationships. Many people began to experience a sense of the company as a whole and to develop feelings of belonging to an organization that was increasingly familiar and accessible. The DIALOG system also provided more effective access to the vast informational resources of the company: it was possible to address a question to a conference and receive responses from those with knowledge pertinent to the problem at hand (p 367).

The most productive use of conferencing tended to be among peer groups for brainstorming sessions and exposure to a range of perspectives. However, the psychological benefits of this form of communication were also a positive factor: *"Some people noted the psychological security that came with being able to take the time 'to say what you really mean', unflustered by the pressures of face-to-face engagement. Many participants felt that they could be more honest in this medium than in any other"* (p370).

A few years after its introduction, when new cost-accounting procedures permitted identification of precise usage levels of each participant, greater stress was put on middle managers to use the system to work with their staff. Although some managers were successful in using conferencing to improve their decision making, many encountered difficulties communicating with their subordinates through the computer medium. They found that their every opinion was treated as a direct request or a policy statement, rather than as simply another contribution to the conference. Some managers claimed that even when they wanted to engage with others outside of the hierarchical relationship, their subordinates made it difficult to do so (p374).

The major controversy which developed and, in the end, led to the curtailment of conferencing in the organisation, concerned the "textualization of sociality". The question of socialising at work is a hazy area when professionals are involved, as it is not always possible to dissociate work exchanges from social exchanges. This ambiguity is usually tolerated in large organisations because it is largely invisible, that

is, it is usually oral and vanishes when the coffee break ends, when the meeting room empties or people part in the hallway. However, computer conferencing commits to text and so makes concrete and public these previously effervescent exchanges (see Section 5 below). One of the most absorbing conferences on the system was intended as a 'computer coffee break', and like all coffee break chatter, it contained an element of off-colour humour and complaints about the work environment of the company. Eventually, printed extracts of the conference messages found their way to management level, and what had always been tolerated orally was considered unacceptable in hard text. *"The horizontal dimensions of organisational life that had flourished in DIALOG were no match, at least in the short run, for the vertical pressure exerted by DrugCorp's managers"* (p 386). In 1983, the company bought a new computer and automatically enrolled all staff on its communications system. The new policy dictated that conferencing was a support device for formal communications and administrative services, rather than the creative medium which the DIALOG promoters had pioneered. As a result, there were fewer conferences and far fewer participants. The predominant use was for short technically oriented messages and routine electronic mail. Some people admitted that they avoided fully stating their position on a given topic within the electronic medium so as to not leave any "written tracks." Individuals would post long documents that were unrelated to the particular questions raised in a conference but that served instead to draw attention to their presence in the conference. Everyone involved agreed that the new emphasis was one of formality, self-consciousness, and self-protection (p 384).

There are a number of lessons to be learned from this example:
- hierarchical status issues play as great a part in the conference environment as they do in the work place generally
- the founding vision of the value and purpose of conferencing in an organisation profoundly affects the nature of the communication which will take place
- conferencing can augment the individual's participation in company life and hence act as a communal resource of company knowledge.

2.5 The Ontario Ministry of Community and Social Services

Another example of the use of computer conferencing to facilitate organizational communication is the case of the Ontario Ministry of Community and Social Services (MCSS). In 1986 the MCSS began to investigate the use of computer conferencing for facilitating inter-organizational group communication flows, particularly between headquarters and the field (regional and local offices). A six-month pilot study was conducted in 1988 to determine the benefits of using computer conferencing for policy and planning activities within the Ministry. The aim of the pilot was to determine potential benefits and difficulties of Ministry adoption of computer conferencing, as well as to generate lessons and guidelines to assist in Ministry implementation of computer conferencing, if that were deemed appropriate from the results of the pilot.

The pilot was implemented on a leased arrangement with the Cosy computer conferencing service at the University of Guelph in a controlled group environment during the spring and summer of 1988. The project design was to use computer conferencing for specific kinds of user groups and applications, such as:

- inter-regional project coordination
- project management and coordination
- general regional management
- improving the effectiveness of meetings
- specific and general information exchange and topical discussion.

Each set of conferences in the pilot was successful in providing a forum for communication amongst its participants. Overall, participation was quite active, resulting in hundreds of messages on various topics. Most users became active participants, and reported wanting to continue using computer conferencing.

Analyses of the productive connect time showed that 65% was devoted to conferencing, 28% to email, and 7% to conversation. The interaction was thus highly group-oriented, primarily utilizing the conferencing features of the system.

Each of the moderators reported enhanced communication as a result of computer conferencing usage within their user group. Specific benefits were derived. These included reduced travel time and costs and enhanced group communications (e.g. through coordination of the consultation processes, information gathering and distribution, and provision of technical training and support). The process of decision-making was improved, since participants had more opportunity to input their thoughts and views on a topic than is possible in a face-to-face meeting. Augmenting opportunities for feedback on various decisions also was found to enhance the decision process. Once the decision was made, it was on the conference for all members to view. This reduced the need for clarification of issues on a piecemeal basis as everyone had access to all issue resolutions. This feature was found to be a major benefit of computer conferencing, an attribute not possible in an electronic mail system.

Computer conferencing was also found to be valuable as an adjunct to face-to-face meetings, especially in providing advance agenda preparation and discussion. Participants reported that the improved and broadened communication afforded more input and influence in the decision-making processes within their groups. An unanticipated outcome was the opportunity to learn new computer skills and applications, and to gain confidence in using computer technology for work. Most participants reported that computer conferencing saved time and speeded the work. The elimination of telephone tag was mentioned frequently.

A number of issues requiring attention were identified as relevant to future applications of computer conferencing in organisations. All moderators and most participants reported initial and continuing difficulties in using the computer conferencing system. Many participants did not learn the important skill of uploading and downloading, which meant an inefficiency of operation and increased connect charges. Participants all commented that they wished that they had more training and easy access to user advice.

Other issues included the need to give attention to process problems, such as selection of appropriate applications and participants for conferencing, the role of delegated participation, rules and protocols for CMC-mediated work, and integration within other communications media. Access problems are also critical: convenient and regular access to a local workstation and telephone is essential for effective utilization of CMC

in administrative contexts. Technical problems can also be a vital issue influencing the success of on-line work. There is a need for user support, both on-line and off-line. An easy user interface, automating dial-up, is valuable in situations where each user has his or her own workstation (this option is not appropriate if the workstation is shared, for security reasons.)

Another important success factor is training: this includes training in using computer conferencing, in moderating computer conferences, and in the general use of computer hardware and software associated with on-line activities. Finally, the project underlined the need to design the on-line environment, providing contextualization for the various types of applications and activities involved in the on-line tasks. On-line work needs to be integrated with other office, communications, and computerisation work, and the use of computer conferencing, it was found, should be viewed as an integrated part of office automation and communication.

3. CMC FOR ACADEMIC COLLABORATION

3.1 Introduction

Scholarly research has traditionally been based on 'invisible colleges' and collegial exchange through various media, but especially print and face-to-face meetings. Computer conferencing is becoming increasingly adopted by researchers and scholars as a medium to facilitate academic collaboration. The many-to-many mode of communication which conferencing supports allows time- and location-independent interactions, and the establishment of cooperative work groups in which all members can share common goals and participate in reaching them.

Academics are 'knowledge-workers' par excellence - creating it, transforming and communicating it, using it, filing and retrieving it. Put in this light it is easier to see how a computer can assist the academic in 'working with knowledge'. The personal computer combined with a printer and communications facilities allows the academic to work with colleagues, make contact with others in the field, be exposed to cross-disciplinary fertilisation, and then to organise, rework and reference these exchanges as appropriate. Some academics find that articles, conferences, or meetings, because of their short time-span and limited interaction opportunities, do not generate ideas or theories as effectively as computer conferencing. As we have seen in the administrative uses of conferencing, the great power of the medium is its potential for interacting in groups. The fact that the medium is also textual, and based on the accumulation of information over time, matches it very closely with the requirements for academic collaboration. However, learning to use a new medium of communication and to effectively integrate it into one's work patterns is no simple matter. The following examples of attempts to use conferencing for academic collaboration (in educational technology, corporate planning, and scientific research) bring out the value and the difficulties of this form of exchange.

3.2 On-line Educational Research Workshop, OISE, Ontario

Linda Harasim at the Ontario Institute for Studies in Education designed and hosted a three month conference workshop with the aim of collaboratively developing and discussing research perspectives for educational computer communications (Harasim and Winkelmans, 1988). The goal of the workshop was to bring together (electronically) leading scholars in the field of educational computer communications to share and develop research skills and insights and identify research needs related to educational computer communications. The intent was to facilitate a collaborative process and, through this, a set of end products or papers. Considerable attention was paid to the design and structuring of the on-line environment in order to facilitate interaction and promote useful exchange. This led to the structure of ten educators with research experience in the field being invited to 'present' a paper on-line and to moderate a conference on that topic, using a collaborative process to discuss and develop the main ideas. Ten other educators with theoretical and practical experience were invited to participate as discussants in the process of refining and reworking the papers. Participants were encouraged to log on at least twice a week, and the three month collaboration ended with a face-to-face meeting of the presenters.

An evaluation of the workshop shows that the overall group process was active and interactive. A set of consistently active conferees emerged as a dedicated core; a minority had a less consistently active role or followed along as readers rather than by actively writing comments. Harasim notes a distinct correlation between the level of input by the moderator and the level of activity in the conference: the more active the moderator, the higher the level of activity in the conference (p 8).

The benefits of this on-line workshop were expressed as follows:
- the discovery of new colleagues and new ideas - participants reported that they appreciated the surprisingly interesting contributions from previously unknown individuals
- the opportunity to update knowledge in the field - research, issues and activities
- the value of collaborating as a stimulating, rewarding process for articulating ideas
- the opportunity to interact over a period of three months encouraged a far deeper and wider exploration and analysis of issues than is possible in any face-to-face activity.

The difficulties highlighted by this kind of interaction were identified as follows:
- finding or making time to participate - on-line work is an add-on to existing academic activities
- adapting habits of work to the on-line process - learning to make small inputs regularly, rather than indulging in crash preparation just before deadlines
- contributing to discussions which wander or do not have a clear task or which diverge from expectations
- moving from exchange of ideas to managing and drawing together the range of disparate perspectives.

The implications of this example of scholarly collaboration are, first and foremost, that it is possible for scholars located in three different countries and two continents to use a conferencing system for active collaboration and discussion, pursuing and deepening common interests. It highlights the need for increased institutional recognition of on-line work as part of academic job specifications. There are also issues to be resolved in the copyright and ownership of the ideas developed on-line. Finally, while excellent for brainstorming and expressing divergent views, conferencing is awkward for moving beyond synergy into organising and managing the information generated by a synergistic encounter.

3.3 Shell International, London

The Group Planning Department of Shell U.K. has been experimenting with computer conferencing since 1985, using the Notepad system. Most of the conferences are associated with business projects of various kinds; however, one conference (called *Open Forum*), is less focussed. Its purpose is to permit interaction among Shell planners and a number of consultants, contacts and University researchers for the extension of business relationships and the exchange of ideas and information.

Open Forum takes the form of a free-flowing discussion, moving through a wide range of topics, some of vital interest to multinational industry, others of a more peripheral kind. About ten Shell employees take part and about twenty outside Shell, mainly in the USA, contribute to the exchange, although many others read without

commenting. Topics have included oil spills, ecological attitudes, global economy, and the effects of computers in planning.

As with the other examples cited above, the main value of conferencing is its potential for idea-generation and for networking amongst people in the same or related disciplines. The additional issue which this example raises is the question of whether these very unstructured discussions have more than ephemeral value. Shell planners have attempted to address this question by producing and distributing paper copies of the conference messages. One of the main concerns is to increase the participation of Shell Planning staff and to engage them in the on-line discussions. It is hoped that reading print-outs of the material will encourage uptake of the system.

Despite the perceived value of the *Open Forum* conference, the computer conferencing activity has not lived up to its expected potential, since many Shell employees who could take part do not do so, despite having easy access to the necessary equipment and software. Those responsible for implementing the use of conferencing at Shell point out that there has to be a clear and strongly felt prior need for communication via CMC, and a specific project to be executed, if the system is to be used to its full benefit.

3.4 Scientific Research via EIES

Hiltz (1984) describes an eighteeen month scholarly collaboration amongst research scientists using the EIES conferencing system. Her data was gathered at several points over the conference period, so that she was able to determine both short and long term reactions to conferencing as a medium for academic collaboration. The resulting case study also looks at the key role played by social processes in determining take-up.

Hiltz discovered that the strongest predictor of the level of use was the participant's own estimate of the time that would be spent on-line before ever using the system. Factors such as typing ability and characteristics of the conferencing system are far less important as predictors of eventual use than are prior motivation and expectations.

The impact of this kind of collaboration on the scientists involved was in many respects similar to examples described above: broadening of professional perspectives, increase in feeling of connectivity, and changes in work habits. Hiltz also addressed the question of whether 'more' connectivity and stimulation produced 'better' quality outputs by looking closely at their perceived improvements in productivity: *"First of all, we note that the system is somewhat more likely to be associated with increases in perceived quality of work than with quantity of work. The ways in which quality is improved can be implied by reports of specific effects such as increasing the 'stock of ideas', providing leads and references, and improving conceptual understanding. The latter refers to shared conceptual space: improved understanding of the nature of work being done by one's peers and increases in their familiarity with one's own work. . . This enables us to understand the link between increased connectivity and increased productivity, in terms of the content of the communications that are flowing through the new on-line links which prove helpful to the scientists in their work* (p 180). Although users joined the system as members of a specific group, they tended to mix with other groups and join other conferences as they gained experience. So the initially

distinct user groups became overlapping networks by the end of the study. This exposure to a broader range of professional contacts, and the consequent availability of a much larger network of people who might be helpful on some future project, was listed as one of the real benefits of the experiment.

One of the problems associated with this example was the high drop-out rate of participants. Forty percent of the scientists invited to participate free of charge either never signed on at all, or dropped out before learning to use the system. Conflicting demands and priorities accounted for most of the drop-out, and infrequent users also said that other professional activities had to take a higher priority. Hiltz concludes: *"The very high dropout rate among invited users is a serious problem for the future of computer-mediated communication systems* " (p 192).

She suggests a number of preventative measures which help to keep participants active:
• a supportive human facilitator available (on-line and by telephone) to encourage and help new users through their crucial first few sessions
• effective moderators who take an active leadership role in directing the discussion
• participants need to spend about an hour a week on-line, as less regular participation leads to frustration by other group members and to forgetting how to use the system.

3.5 International collaboration in biotechnology

One of the best-documented examples of computer conferencing for academic collaboration is a study of the process and outcomes of an international computer conference on the bioconversion of lignocellusics, which took place from May to December of 1983 (Balson, 1985). This conference was run both on EIES and on COM (in Stockholm), and involved over 100 researchers from 23 different countries - both developed and developing countries, although the majority of the participants were from developed countries. (Some participants contributed via telex, as they were unable to access either of the conferencing systems). Five topics were set up for discussion, each with a co-moderator working with the overall conference moderator - each had appropriate scientific and engineering expertise, but were novices to CMC. The experiment was neither a total success nor a total failure, and well illustrates the problems and issues involved in using CMC for this type of activity.

For the great majority of participants, this was the first experience of computer conferencing, and the initial two-month period was primarily a slow learning process. In contrast, at the end of the project period, when there was a one-week "dispersed workshop" via computer conferencing, there was a major problem of information overload. At both the beginning and end of the period, it is clear that the organisational inputs required had probably been under-estimated - more help was needed to get people using the system more quickly at the start, and tighter moderation might have mitigated the overload problem at the end of the conference.

After the conference, participants were sent evaluation questionnaires asking for their assessment of the scientific value of the conference, and their perception of the value of CMC *per se*. The comments and ratings concerning the scientific content of the conference indicated a need for improvement - concerns were expressed over the low participation rates, the low quality of many messages, and a lack of organisation and

focus in the conference topic discussions. Participants in the developing countries found the conference more useful than those in the industrialised countries - where a high expectation of new technical information generation was not realised. In fact, many participants from the more advanced countries were unwilling to share new unpublished research results.

As for the technology itself, for participants from developing countries (many contributing by proxy because of the impossibility of gaining on-line access) the major barriers to use of CMC were costs, telecommunications difficulties, problems with access to a terminal, and time constraints. For respondents from the industrialised countries, the major concerns were time constraints, lack of face-to-face contact, costs, and difficulty over acces to equipment.

Despite these difficulties and criticisms, around 75% of the participants who responded to the evaluation questionaires said they they would partipate in a future computer conference if it was in a subject of interest to them. The specific benefits cited included the written record of the discussion, convenience in participation times, and time for reflection. However, this relatively positive overall judgement has to be interpreted in the light of the facts that only 25% of those invited to participate in the conference actually did so, and of these, 28% did not respond to the questionnaire.

A content analysis of the transcripts of two of the conference topics revealed a number of interesting points. Altogether around 900 message texts were analysed: of these, about 50% were considered to be of a 'scientific' nature (ie pertaining to the scientific discussion topic). About 50% of the texts were comments on preceding texts; about 20% of the texts were specific questions, but only about 30% of these were answered. About one-third of the messages failed to include in their headers keywords corresponding to the actual content of the message. These findings clearly reveal the problems that users would have experienced with the conference: only one message in two being relevant to the topic, questions not receiving answers, and many texts inadequately titled, thus making searches for relevant information more difficult.

The following main recommendations could be made on the basis of this project:

- there is a need for an expansion of access to international data networks from many developing countries, and for adequate technical support
- equipment and facilities for participants (terminals, micros, modems, software, comms links etc) must be close at hand and readily available if CMC activities are to be integrated into normal research and academic communication processes
- ready access to good support is essential - including manuals, user guides, on-line help, and colleague advisors
- face-to-face meetings amongst participants should, wherever possible, take place during the initial period of CMC discussions
- moderators should be given plenty of time to prepare a conference, and to moderate it properly once it is running
- CMC systems should be chosen with care, taking into account factors such as ease of use; facilities for off-line editing, for linking comments, and for sub-dividing conference topics; and ability to inter-connect with other systems.

4 CMC FOR TEACHING

4.1 Introduction

Of the educational applications of computer conferencing, teaching and tutoring have been the most often exploited, not surprisingly. The examples given here, all at post-secondary level, are from three different types of institution:

- traditional campus universities (New Jersey Institute of Technology, Bath University)
- distance teaching universities (The Open University)
- graduate schools (The Ontario Institute for Studies in Education)

Through on-line communication facilities, students can very easily contact each other, transfer text and data files, and obtain information from computer databases regardless of space or time constraints from their homes, their workplace or the campus terminals. Teachers and tutors can use conferencing for discussion, support, information exchange and delivery of course material.

On-line education has unique attributes even though it shares some of the features of place-based education (notably group interactivity) and of distance education (notably the freedom from time and place constraints) (Harasim, 1989). Computer conferencing has been used for teaching in a number of different modes depending on the nature of the institution and the students. These various modes are most easily described as a sliding scale from a very marginal support role for conferencing in the delivery of the course, to a totally on-line delivery of the course. Examples from a number of points on this scale are included below.

4.2 New Jersey Institute of Technology (NJIT)

From 1985 to 1987, with major funding from the Annenberg/CPB Project, NJIT constructed a prototypical *Virtual Classroom*, offering many courses fully or partially on-line (Hiltz, 1989). Students and professors, using personal computers, communicate with each other through the Electronic Information Exchange System (EIES), which was enhanced with special software to support educational delivery (EIES runs only on a computer which is made by Perkin-Elmer Corp., and which resides at NJIT). A subsequent version of the *Virtual Classroom* (called TEIES) which operates on IBM mainframes, will be available for lease to other educational institutions.

The project included iterative development of both software and teaching techniques. Innovations were implemented, studied, and then incorporated into software modifications. Three kinds of software innovations resulted:

- branch activities which could be attached to a class conference in order to support special types of assignments or delivery of materials for activities that were to involve the whole class
- a set of teaching support tools to help the instructor manage assignments and grading and quizzes for individual students
- microcomputer-based software for the integration of graphical information with text.

The *Virtual Classroom* project involved the on-line teaching of a number of undergraduate courses at both Upsala College and at NJIT. The two colleges provide very different implementation environments. Upsala is a small liberal arts college with little computer equipment and very little prior integration of computing into the curriulum; NJIT is a technological university where for the last three years incoming freshmen have been issued IBM-PC compatible microcomputers to take home, and computers are used in all freshmen-level courses (Hiltz, 1989). Some of the courses were offered entirely on-line, others in mixed or adjunct mode. These included courses on a variety of subject areas: organisational communications, writing, anthropology, business, French, introductory sociology, and computer science.

Most of the on-line courses used some form of collaborative designs, including one or more "seminar" type segments in which the students became the teachers. Individual or small groups of students were responsible for reading the material not assigned to the rest of the class, preparing a written summary of the most important ideas in the material, and leading a discussion on the topic for the class.

Another course design used was a role-play or simulation. In the *Virtual Management Lab*, NJIT management students applied the theories and techniques that they were studying to a simulation of the first fiscal year of a hypothetical corporation. They decided how to organize the corporation, selected the individuals to play roles such as President and Vice President for Finance, and developed various product and marketing plans that would be needed in a real organization. The instructor played the role of the market, the governments, and other event-generating entities in the environment. Another strategy used in the *Virtual Classroom* is that of peer learning groups. Students worked together to assist one another in various tasks (ie. individual writing assignments) and responded to specific questions from the instructor on how the product could be improved.

The conclusions reached from the *Virtual Classroom* project were that learning outcomes were at least as good as outcomes for traditional face-to-face courses. The average student who participated in the on-line experiment felt that both access to and quality of the educational experience were improved.

However, the improved outcomes are contingent upon providing adequate access to equipment, as well as other factors such as faculty effort and skill in teaching on-line, and student characteristics. Students who are motivated to work on-line and who are self-disciplined, with average or better than average verbal skills are likely to produce superior outcomes, as compared to traditional courses (Hiltz, 1989). Students who lack this motivation, or who are deficient in basic college level skills, or who must travel to access a computer, are more likely to drop out of an on-line class, or to participate more irregularly, or perform more poorly than they would in a traditional course.

4.3 The University of Bath, U.K.

This trial use of CoSy within an on-campus in-service course in educational technology involved practising teachers taking a Master of Education degree programme (McConnell,1988). The aim was to offer these teachers an opportunity to experience a new educational medium, and to reflect on the possible uses of such technology in their

own professional practice. CoSy was to be used in the course as one of several participatory methods of learning (including face-to-face meetings and group video production). The task was to discuss a paper on student learning via conferencing, and students could do this from terminals on campus in between other classes.

McConnell's evaluation of the trial shows very mixed reactions amongst students. Although a lively and interactive discussion eventually did take off in the twelve-week period of the course, students generally rated the outcomes of the experiment very low. These outcomes included the amount of work covered, the amount learned, the level of stimulation and ease of assimilating information.

McConnell looks at similar findings from other examples of users' perceptions of new technologies and concludes: *"Previous work carried out by myself into user perceptions of Cyclops shared screen teleconferencing also indicates a high degree of dissatisfaction with the educational outcomes of such meetings. The gauge or yardstick by which users rate new technologies such as CoSy and Cyclops seems to be that of face-to-face meetings. The rich complexity of face-to-face meetings, although not always meeting everyone's needs, certainly offers the possibility of satisfying the eager learner."*(p 17)

Lack of time to participate was the now familiar reason given for limiting use of the system. McConnell (who was both teacher and evaluator of the experiment) acknowledges that he may not have allocated enough time to this aspect of the course so that students did not feel they could participate effectively through this medium. He also found, as many other studies have shown, that much more time than anticipated was required for students to begin to feel at ease with the technology and to begin to address educational issues. Access to terminals also limited the use made of conferencing. Although plenty were available throughout the campus, students seemed to be hesitant about using terminals outside the supportive environment of their department. Furthermore, the terminals did not provide facilities either for printing out CoSy messages or for scrolling back over previous screens, which seriously restricted the potential value of conferencing for the students.

Finally, students complained about the length of the conference (about 150 messages by the end) and the difficulty of following and keeping abreast of the many aspects of the discussion. McConnell comments: *"Using the search command to weave through the topic helps reduce the sense of too much data - yet, for many students this would not coincide with their perception of the discursive role of a seminar where the focus is on FOLLOWING ALL participants' comments. The unique characteristics of computer conferencing require a shift in the perception of the role of discussion in seminars away from linear discussion paths to that of many branching paths which have to be considered and dealt with simultaneously."* (p 14)

4.4 The Open University, U.K.

The Open University example is similar to the Bath trial in that the use of CMC is a very small part of the total course. However, it is very different in that it deals for the first time with the educational exploitation of computer conferencing on a multi-media

distance education course with very large numbers of students accessing the same system. Furthermore, these students are each equipped with a PC, printer and modem and log on to CoSy from their homes all over the country. The course in question (*An Introduction to Information Technology: Social and Technological Issues* / DT200) is part of the second level undergraduate program, lasts for nine months, and will be repeated each year from 1989-1994. Although steps were taken to integrate the conferencing element into the course as a whole, there is no doubt that many of the 1300 students regard it as a marginal extra in an already overloaded course. As in the Bath trial, lack of time to participate was the main deterrent to use. The conclusions from this experience summarised below are based on an evaluation of the first year of presentation of the course, in 1988 (Mason, 1989).

Access to CoSy was facilitated by the in-house development of front-end software, which provided automatic log on facilities, an off-line editor for preparation and downloading of conference messages, and an optional menubar on-line so that commands could be selected rather than remembered. Although this software was by no means bug-free, feedback from students shows that these features were well used and appreciated. Nevertheless, cost of accessing the system was the most dominant complaint in the first year of operation. Due to the nature of the University's dial-up network, only half of the students were within the local call charge band and the other half faced high telephone charges even at off-peak times.

As in the Bath trial, one of the aims of introducing the medium was to offer students practical experience in using the technology. In addition, as distance learners, students were provided with half of their normal tutorial provision on-line. Each of the 65 tutors was given a closed conference in which to hold discussions with 25 assigned students. One conference (the *forum*) which everyone could access was provided for socialising and general discussion of course issues and difficulties. Contrary to expectations, this general conference became the 'working' space for almost all who made use of the system, and the individual tutor conferences were used largely for chit-chat and for information exchange about assignments.

The *forum* conference consisted of many topics, one for each block of the course, for the practical work, for assignments, for technical difficulties and so on. Discussions were dominated by about 100 regular contributors (students, tutors and staff) and by the end of the course many of the topics had between 200 and 700 messages. Consequently the volume of messages for all but the very frequent and regular users was very difficult to manage. The tools within CoSy to manage large conferences - the *skip, list headers,* and *read by reference* commands - really do not address the problem of the infrequent user wanting to get information efficiently, let alone to contribute to a discussion (p 132).

Approximately one third of the 1300 students contributed one or more messages to the course conferences; another third participated only by reading, and the final third, who logged on less than 5 times, did not take part. Extensive evaluation of student opinion shows, nevertheless, that students were very positive about the value of computer conferencing for distance education. Convenience was one of the main benefits cited by students, who are often reticent about contacting their tutors by telephone. In this regard the email facility within CoSy was an invaluable, less intrusive alternative to the

telephone. Increased access to help was another major benefit of the system. The *gremlins* topic of the *forum* conference, where students were to report practical problems was the first exchange to take off, with over 500 messages generated in the first three months. A number of students and tutors took a very active part in supplying 'fixes' for the many difficulties reported there. Indeed, these active participants were in most cases considerably ahead of the central staff in providing useful advice and support to students (both to questioners and to the many lurkers). This topic was outstanding as a vehicle for those with expertise to become known on the system and to offer the benefit of their experience to the course team and students alike. Members of the central staff who wrote the course contributed extensively to *forum* topics, extending and developing areas of the course, and explaining and interweaving parts of the course material.

Unlike some of the administrative examples described above, the OU experience shows considerable equalising of status and breaking down of established hierarchies. In certain respects, the use of CoSy increased students' ability to participate equally. For instance, the status and personal appearance of users are not evident on the system, so students who work unsocial hours or are housebound were suddenly able to take as much advantage of what was offered as other students. Disabled students were not identifiable as such and tutors were not distinguishable from students by the ID. The peculiarly personal yet detached atmosphere of conferencing obviously encouraged many students to express their opinions, whether positive or negative, and to contribute information from their previous experience, with all the hallmarks of equal members of a group. The feeling shared by some students and tutors of being involved and even influential participants, rather than passive recipients of a course, has played its part in sparking real enthusiam for the course. CoSy has also been a vehicle for open criticism of course material, and vigorous complaints and outright condemnations have appeared in conferences for all to read (p 129).

In addition to correcting bugs in the software, a number of major changes have been made to the structure of the conferences in order to increase the level of participation and reduce the overload for the following years of the course's delivery.

A number of important lessons can be drawn from the extensive evaluation of this case:
- for those who take part, computer conferencing can be an exciting and satisfying way of increasing interaction for students at a distance
- relegating computer communication to a very small part (in this case, about 5%) in a course inevitably leads to marginalisation and lack of use
- cost of access is a significant deterrent, particularly when learning to use a conferencing system and developing confidence in the early stages has to be carried out at the student's expense
- it is possible with adequate support facilities (both software and human) to teach large numbers of students the rudiments of conferencing entirely at a distance
- the exploitation of conferencing to achieve educational goals requires careful and extensive structuring of the on-line environment so that both students and tutors can make productive contributions
- conferencing can tap the invaluable resource of adult students' experience and expertise to the benefit of all concerned.

4.5 The on-line Campus: The Ontario Institute for Studies in Education

The Ontario Institute for Studies in Education (the Graduate School of Education for the University of Toronto) was the first in Canada to offer credit and non-credit courses entirely on-line, using a computer conferencing system. OISE, together with the Connect Ed programme at the New School for Social Research in New York, was also first in the world to offer graduate level courses entirely on-line.

Since OISE purchased the Participate computer conferencing system in 1985, CMC usage is growing rapidly and on-line communication has become increasingly integrated into the Institute's academic, teaching, administrative, and support activities, building towards an "on-line campus". The Institute is one of the few institutions to have a full-time Computer Conferencing Coordinator to provide support and consultation in educational network design, user assistance activities, research strategies for on-line education, and formative and summative evaluation of the on-line activities.

OISE currently uses computer conferencing in a number of ways:
- for totally on-line delivery of credit graduate level courses (including contact with OISE's library staff), and use of the bilingual Parti for delivery of OISE courses in French and for bilingual projects and activities
- in adjunct mode, to complement face-to-face and distance mode classes by extending discussion opportunities and promoting student information-sharing
- for non-credit course delivery, such as professional development to teachers and educators around the province
- for research networking, linking geographically distributed researchers
- for coordination and support of regional, national and international projects and planning committees (ie, the Canadian Small Schools network, the Latin American educational computer network)
- to enhance communication among special interest groups, associations, committees, etc. among student, faculty, and/or staff
- as a channel of information to the OISE community on various activities, forthcoming events, deadlines, etc.
- to support school and teacher networking, in both English and French
- to provide on-line training and support in various computer software, applications, etc, to OISE staff, students, and faculty.

The emergence of an on-line campus is becoming an increasing reality at OISE, as more and more resources become available on-line. While initially the conferencing system was used almost exclusively for the delivery of courses totally on-line and in adjunct mode, more recently the system was opened to the general user and conferencing is beginning to flourish at OISE. It is viewed by users as a "meeting place" for the OISE community, for both formal and informal exchanges and networking. For those who use computer conferencing, it becomes integrated as an essential aspect of the way in which they work, study, and conduct research. And, by having more services available on-line, the OISE campus becomes increasingly accessible by users regardless of their location.

The electronic communication medium is popular with students and staff who appreciate the 24 hour, seven day a week access to the conferences. Analysis of the usage statistics from the on-line courses shows that the conferencing system is accessed around the clock, seven days per week (Harasim, 1989). Asynchronous communication is credited by users, particularly students and faculty, as enhancing the quality of educational interaction. Users have the opportunity to read and reflect, before responding. Cognitive activity is enhanced by increased user control over the time, place, and pace of interaction. Moreover, there is no competition for scarce airtime, hence encouraging a broader and more active participation than is possible in face-to-face environments with finite time for meetings and classes.

Faculty using the system are enthusiastic about the ability of CMC to reach learners anywhere in the world, and to overcome the traditional isolation of the distance learner by augmenting access to the instructor, to library staff and resources, and perhaps most importantly, to other learners. Instructors who teach on-line report that the opportunities for engaging with the individual student as well as with the group are augmented, since the text-based and asynchronous medium allows more opportunity for purposeful interaction.

One of the major findings of OISE's work in on-line education thus far is the need to explicitly design the computer conferencing environment to support a group learning approach (Harasim and Wolfe, 1988). It is necessary to take into account such factors as the nature of the task/ activity, and the nature and size of the group. The type of application has implications for the design of the on-line environment, influencing, for example, the number of conferences and branches opened, the type of interaction (one-to-one, one-to-many, many-to-many), the activities designated for a particular conference, and the timing of the activities being conducted in the on-line mode.

The conferencing system represents for the user the primary educational environment. It is this electronic space in which the activities take place and it is thus essential to design the environment for the particular application. An important initial step is to conceptualize the 'architecture' for the particular applications: an *on-line campus*, a *virtual classroom*, an *on-line workshop* or an *electronic meeting* are examples of metaphors employed for conceptualizing this space (and for introducing it to the participants).

OISE's on-line course design builds upon the distinctive character of the conferencing system to develop a learner-centered, group learning approach. The multiple conference spaces and branching capabilities are used to create a rich and varied learning context, involving many conferences and sub-conferences to provide spaces for core and supplementary learning activities. The on-line courses use a number of innovative instructional strategies, which are based upon collaborative or group learning approaches reformulated for the on-line medium. These include electronic seminars, plenary and small group discussions, guest electures, on-line working groups, team debates, and informal conferences.

The course conferences differ in their task, composition, and time availability: core activities such as the seminars and working groups have specified timelines (one to four weeks in duration), while informal conferences to provide technical support,

socializing, and access to the library, are open the full duration of a course. One measure of participation and active learning used by OISE researchers investigating on-line learning is the amount written by each learner for a particular task or activity or during a particular period. The Participate conferencing system automatically generates records of the number of messages and the size (by character) of each message sent, contained within the message header. Analysis of the on-line courses show active participation and interaction: message volume is high (users average around 5-10 messages each per week). Message volume seems to rest more on the nature of the task than on user demographics (male/female; full time part time, etc.). Users tend to participate regularly and the distribution of communication among members of a course is relatively equal. Unlike the typical pattern of classroom communication, characterized by one or two students dominating the discussion with the majority remaining silent, in the on-line context, most students are participating and the volume of contribution within each class is relatively equally spread (Harasim, 1989).

On-line group learning activities are viewed by participants as contributing to effective learning and enhancing purposeful, active, and democratic learning. There are both cognitive and socio-emotional benefits to learning within the computer conferencing environment. Increased access to peers, as well as to the instructor and the library, are highly appreciated, and are viewed as contributing to a highly interactive, intellectually and socially dynamic environment.

However, there are also problems associated with learning on-line. One of the most important is the technical difficulties experienced by new users. Although OISE's on-line courses have very low attrition rate (less than 10%) nevertheless some new users apparently put up with many frustrations and time consuming efforts before they are able to successfully negotiate the modem and datapac connections. Nearly 60% of reports of problems on-line have been associated with technical issues. These problems do not affect all users, but for those who are affected, there is a negative impact on the learning interactions.

The asynchronous text-based medium makes some aspects of collaborative group work particularly successful. Other aspects have been found to be problematic. For example, asynchronicity allows more time to consider a decision and hence contribute to a better, more consensual outcome. On the other hand, the asynchronous text-based medium can make decisions associated with group formation and product development more difficult, particularly when there is a need for a timely decision but some key individual has not yet logged on to input. Moving from divergent to convergent thinking is difficult on-line since there are no tools to support linking and structuring the ideas. Paradoxically, collaborative efforts seem to need more structure, such as that provided by an instructor or moderator.

Other key issues identified at OISE as influencing the outcome of on-line courses include group size, timelines, nature of task, moderator style, group composition, and information management.

5 CMC FOR SOCIAL NETWORKING

5.1. Introduction

The examples and case studies presented above all describe fairly coherent and structured activities, such as courses, workshops, meetings, and various academic collaborative tasks and projects. These activities typically have specified objectives, agendas, and timelines.

However, there are other roles for computer conferencing, which go beyond, and yet are often essential to, the achievement of a particular task within a particular institutional milieu: we have grouped these roles here under the umbrella heading of 'social networking'. The advantages of social networking which CMC provides is in almost all cases regarded so positively that it is presented here as a separate category, despite the fact that it overlaps with all the previous studies. Undoubtedly the success of computer communications in this regard is due to the fact that we are social animals, who need and want to communicate.

Computer conferencing is above all else a medium of interactive communication, which supports exchanges from the trivial, the mundane, the comic, the emotional through to the most intellectual and reflective. Furthermore, unlike any other medium, it offers the possibility of creating a 'group mind', a flowing thought space which is more than the sum of the individual comments, and can be sustained much longer than a face-to-face meeting. Perhaps the real motivator of most conference users, however, is that it is great fun! It is exciting to log into a continuing flow, to give and take, to 'meet' new people and experience the growth of the group creation. The element of surprise, suspense and curiosity is aroused, and some people discover unknown talents in themselves through this medium.

The *Télétel* public videotex system in France (Marchand, 1988) is an example of the adoption of a communication system for social, commercial, and cultural activities - in this case, none of the original planners of the system realised that one of the most popular applications would turn out to be chat and contact services, based on electronic mail and group conferencing software.

In North America, commerical computer conferencing systems such as *The Source* (which uses Participate), the *Networking and World Information* (NWI) system (Participate based), and *MetaNetwork* (which uses Caucus) are examples of social network systems with hundreds of thousands of users. *The Source* and *CompuServe* (recently merged into one system), both began as on-line databases; however, today almost 90% of the usage is for communications (see Glossbrenner, 1983; Shapiro, 1983). There are thousands of conferences available on any topic imaginable, linking users on the basis of common interest rather than geographical location. On-line friendships, even marriages, have resulted (Ferrarini, 1984).

Networks on these and other systems number in the hundreds, possibly thousands, in North America, as professionals such as lawyers and educators use computer conferencing to establish collegial networking and to enhance information access,

sharing, and project management.

In this report, we examine the role and functions of social networking under four principal headings: overcoming isolation, extending networks of contacts, serendipitous encounters, and socialising. Although there is overlap between these four areas, they each nevertheless have distinct attributes.

5.2 Overcoming Isolation

Computer conferencing can go a long way to fulfilling some of the communication needs of people who are remote from each other geographically, socially, or economically - or simply because their individual time schedules do not permit 'synchronous' contact. The mere psychological effect of having the facility to get help or make contact with people has been shown to be very strong (Mason, 1989). For many people - the lonely, the disabled or housebound and the distance learner - CMC can be a real life-line. Distance learners are able to assess their progress in relation to other students, and find reassurance in the discovery that they are not the only ones having difficulties. Disabled students have been able to participate just as other students. People in remote locations, whether students or committee members or people with special interests, are suddenly as much a part of the group as anyone else. One Open University student commented: *"CMC has allowed me to share the experiences and to 'listen to' the views of many more students and tutors than I would ordinarily meet at course tutorials. I would think that at this point on the course - just over half way - the CoSy experience adds up to much more than the TOTAL of all tutorials that I have attended on four previous courses. Despite the medium's inability to transmit the smiles (and glares) and other non-verbal speech parts enjoyed face-to-face, I still feel more involved and a part of things than I have done on other courses. CMC, as implemented on this course, is one giant step toward removing that feeling of being 'on your own' suffered by OU students, certainly by me."*

5.3 Extending Networks of Contacts

Studies continue to show that interpersonal communication provides researchers with their most important channels of access to information and stimulation for new ideas (Zuboff, 1988: 363). DrugCorp, mentioned above, discovered that computer conferencing reduced the duplication of unsuccessful experiments and more quickly diffused the results of problem-solving accomplished in each plant. These advantages accrued even to those who read rather than contributed to conferences, as 'lurkers' used the conferences to increase their familiarity with a wide range of subjects and to learn from watching how others' minds work (Zuboff, 1988: 368).

Within the academic community at large, the advent of electronic networks such as EARN and BITNET, as well as the often large external memberships of some CMC systems, has enabled many university and college teachers, administrators, and researchers, to make and develop contacts with like-minded colleagues in other institutions. Such contacts can lead to collaborative research or teaching projects, or to the sharing of information on particular issues. For example, there is a conference on the CoSy system at the University of Guelph to which key members of all other CoSy sites are automatically joined. This means that common interests and ideas in

enhancement of the CoSy source code, and ways of using it for teaching, can be shared between any interested sites very easily.

5.4 Serendipitous Encounters

CMC can be used not only for deliberate and planned extension of social and academic networks of contacts. Computer conferencing, and the posting of notices on bulletin boards of large systems, can also allow for the electronic equivalents of the chance encounters that are made at face-to-face conferences and conventions, and at the sites of social exchange (bars, cafeterias, clubs, common rooms etc) of large campuses. In fact, if there are sufficient numbers of people using a system, the range and scale of contacts made electronically can be greater than in more conventional social milieux.

Many students at the British Open University, for example, who have come across interesting messages in public conferences, use the *show resume* command in CoSy to find out more about the author of a particular message, then make personal contacts via the CoSy mail facility. Others have set up 'chatlines' using CoSy's conversation facility, and out of the resulting chance encounters and discussions, more durable contacts have developed.

The unpredictable nature of conferencing contributes to the sense of excitement which many people feel about using this medium. Encountering new ideas and unknown people was acknowledged in the DrugCorp experience to add a vital spark to the creative process: *"The spark for innovation is usually unexpected - in the hallway or over lunch. DIALOG is the closest thing I know to running into someone in the hallway. It has the potential for that kind of spontaneity, which is so often the source of new ideas. When you walk down the halls of DIALOG, you know you'll meet somebody"* (Zuboff, 1988: 370).

The contribution that CMC can make to organisational vitality and health, precisely though the way in which it allows for chance meetings o minds - a planned and structured framework within which unplanned events can occur - should not be ignored. The likely value of this feature is, of course, to a large measure dependent on the number and diversity of users on a given system - the more they are, the more often they log on, and the more varied is the range of backgrounds, departmental interests, and expertise they represent, the more likely is it that there will be fruitful spin-offs for the organisation.

5.5 Socialising

A pre-requisite for successful and potentially fruitful meetings of minds within CMC systems is often - as in other social communication situations - the opportunity and time for diffuse, unstructured, and (apparently) pointless communication. Turn-taking activity within computer conferences - just as in ordinary conversations - often contains sequences of informal exchanges. There is considerable controversy over whether this aspect of conferencing is to be regarded as a strength or a weakness (Graddol, 1989). Often, it is regarded as a problem, and the informal discourse which results is dismissively referred to as 'chat', 'unstructured', or 'off-topic' (p 236).

Students using CoSy at Bath University and at the Open University had various reactions to the socialising messages in conferences. Some complained that the conferences were full of garbage and these messages contributed to the overload on the system and became an obstacle to participation. Others complained of the time and cost of wading through other people's chit chat. *"One person' self-expression is another person's phone bill"*, became a byword at the Open University. Other students found ways of coping with the overload and turned the socialising potential to their advantage: *"The social side seemed to evolve naturally with the use of the medium and I was surprised to find that personalities were very much in evidence. Friends sensed when I was feeling below par and their light-hearted comments boosted me when the workload was heavy."* (OU student).

Most organisers of conferencing applications provide special areas for chat and socialising. At the Open University, each main DT200 course conference has a *chat* topic, and students are asked to try to keep their socialising messages to these areas. Connected Education, on EIES, has a *cafe* for talk outside the main course conferences. The DrugCorp conferencers turned their *coffee break* conference into an extension and elaboration of the oral culture in which they conducted their professional work. Some employees found that spending their free moments in this conference was more fun and rewarding than a 'real' coffee break: *"I look forward every day to getting on CCB. It has given me a renewed enthusiasm for being at work that sometimes shows up as a creativity that has spilled over into another conference or project."* (Zuboff, 1988: 378). Management of the company, however, were not able to appreciate how the electronic network improved morale. The company hierarchy did not understand the social and emotional needs of people to communicate, and viewed the socialising on-line in terms of security risks, cost, and the growth of a counter-culture.

Regardless of the differences of opinion that might exist concerning the value and importance of electronic chat and socialising, there is no doubt that, for new CMC users, such activities are an esssential part of the learning process, and should not be discouraged. Any new mode of communication requires an initial period of familiarisation, and the social support and practise at 'learning the ropes' which informal, unstructured, exchanges can provide are essential contributions to the learning process. It is only when new learners have achieved sufficient mastery of the system and its commands in such non-threatening situations that they will be able to go on to make the substantive contributions which will be expected in the serious professional and academic conferences. And those experienced and mature users who continue to use the system for socialising and recreational activities can play an invaluable role - as electronic social hosts and *animateurs* - in helping new users become familiar with CMC and its potential.

6 CONCLUSIONS

6.1. Introduction

The various case-studies and examples cited in this report illustrate a number of general principles concerning the use of CMC in an academic environment, whilst at the same time presenting a reasonably representative cross-section of the problems and successes of specific applications. In this final section, we attempt to draw out some of the general principles that seem to us important in considering the ways in which CMC might be successfully implemented, by looking at four particularly important aspects:

- access to CMC
- institutional support for CMC
- getting new users on-line
- the role of conference moderators.

In doing this, we refer back to the case-studies where appropriate, and try to identify the factors which appear to be associated with success and failure in the adoption and use of CMC.

If there is one over-riding factor which is of major importance in determining success, and which is relevant to all of the aspects discussed below, it is the importance of ensuring that the right conditions are met for true group collaborative processes to develop on-line, if the full potential of CMC is to be realised. As was pointed out earlier (Section 1. 4 above) people generally have no problem in adopting electronic mail as a communication medium, because it parallels an existing and familiar mode - paper mail. However, learning the effective use of a novel group communication mode - computer conferencing - is another matter. At the Open University, for example (see Section 4.4), conferencing was seen by many students as a marginal activity in an already overloaded course, and the great majority of the 65 tutor group conferences were a failure in 1988 - despite prior assumptions that a group size of 20-25 would be optimal, and that students who had met face-to-face and were with the same tutor would want to use conferencing. In this case, a critical mass of contributors never developed in these conferences, and the tutors had not gained sufficient expereince of the use of the medium for group-based, collaborative, teaching. At Shell International (see Section 3.3), there is a similar problem - namely, the small percentage of active and regular users of the Notepad conferencing system, unless it is being used for a specific project where there is a need for information sharing to meet a particular objective or deadline.

The real potential of computer conferencing lies in the domain of collaborative work (rather than straight information exchange) where each participant in a discussion builds on the contributions of others, and where, eventually, a new synthesis of ideas, or a new project or plan or product, emerges. This is not just a CMC issue - true collaborative endeavour is very often demanding and time-consuming, whether it is carried out in face-to-face meetings or via computer conferencing. However, the end result is often well worth the additional effort. The challenge in using computer conferencing is to make sure that the right conditions are created for the development of effective outcomes from collaborative activity.

6.2. Access

An absolutely essential pre-requisite to adoption of CMC is ready access to the necessary equipment, software, and telecommunications links at the user's habitual workplace. Opinions differ as to the pros and cons of using 'dumb' terminals or 'intelligent' micro-computers and PC's. For users who are already familiar with one or other mode of operation, it is probably easiest to continue in that mode; people who are habitually users of terminals which are connected to a mainframe via a campus network, and who are not paying communication costs, will probably prefer to continue using the same terminals for conferencing, in conjunction with whichever text editor they already know. However, it should be pointed out that terminal equipment should at least have a scrolling capability, and an accessible printer: students at Bath University found the lack of these features a strong deterrent to use (see Section 4.3).

Likewise, those who do most of their text preparation on micros and PC's, and/or who like to work from home as well, will prefer a basically off-line, local, mode of operation, with connections only being made to the conferencing system for browsing and for uploading and downloading of material. In cases where the choice is open (ie if a decision is to be taken to purchase *either* terminals *or* microcomputers for user who are not yet committed to either) the more flexible option would be to chose an appropriate micro-computer with terminal emulation software, and preferably with a user-friendly front-end which can be easily tailored to automate the connection and logon procedures (see Section 1.9). These procedures (setting up a modem, connecting to a host computer, routing through to the CMC system etc), unless made transparent, can be very daunting and frustrating for novice users.

6.3. Support

However, access to equipment and user-friendly communications procedures does not by any means guarantee that people will use a CMC system, even when there is a clearly identified need which CMC can meet. Any organisation planning to exploit CMC to its full advantage will also need to ensure that there is a proper framework for:

- promotion of the use of CMC within the institution
- management and running of the system
- ongoing user support
- training, help, and documentation
- provision of system enhancements.

At The University of Guelph (see Section 2.3) a new post of Diffusion Manager has been created to cover the first of the above functions. At the University of Arizona, a highly structured and phased implementation strategy was devised for the introduction of the use of CoSy throughout the campus (Caldwell *et al*, 1987). At OISE, a special post of Computer Conferencing Coordinator has been created (see section 4.5 above)

At the British Open University, a variety of means are deployed for supporting current and potential CMC users. These include a permanently manned help desk in the Academic Computing Service, to advise campus staff on all aspects of academic computing use, including CMC. For students, there is a telephone 'hotline' manned until 21.30 on weekday evenings, and over part of each weekend, plus a course-based

'CoSy coordinator' to whom email requests for help can be sent, plus hands-on demos and workshops arranged locally. Enhancements to the CoSy source code which a specific course team might require are discussed with the CoSy systems operator in Academic Computing Services, and are implemented whenever feasible within the resources available. Research into potential uses of CMC and evaluation of current applications - especially for group collaborative work - is carried out within the University's Institute of Educational Technology.

Formal institutional support for CMC should always be linked with informal support and peer help from enthusiastic users, be they student 'hackers', staff, or external guests on the system. One of the interesting and highly valuable features of conferencing systems in this regard is its flat, non-hierarchical communication structure. Any one user can contact any other user on the system; enthusiasts can set up conferences to provide help to newcomers, and to do collective troubleshooting. It is often quicker and easier for someone to get help when they need it through such channels than it is to wait for the official answer from the appropriate department or staff member. For example, one of the busiest and most useful conference topics on the Open University DT200 course in 1988 was the *gremlins* topic in the national course *forum*. This very quickly filled up with hundreds of messages, as students and tutors experiencing problems with hardware, or with CoSy, helped each other with tips and solutions. The resulting transcript proved to be an invaluable source of feedback for debugging items of course software, and for making other improvements and changes for the next presentation of the course. Fifty or so of the students from the 1988 presentation of the course have asked to keep their ID's on CoSy, and have set up an *alumni* conference to stay in touch with each other. In return, they have offered to provide peer teaching help, if asked, to the 1989 cohort of students.

6.4. Getting new users on-line

Once the issues of technical access and a framework for ongoing support have been settled, it does not automatically follow that new users will start logging on to a conferencing system. There has to be an appreciation of the value of conferencing for group learning and collaborative activities, and this appreciation will only develop once people have had successful experiences with the system. Any overall implementation strategy would do best to start with applications and pilot projects where the conditions are favourable, and where there is a group of enthusiastic and committed adopters with a clear recognition of the need for conferencing facilities. These early users can then provide the initial critical mass of conferences and activity on the system. The people involved should be given sufficient time to use the system properly - conferencing should not be seen as an add-on activity to be carried out in addition to other, pre-existing, responsibilities and tasks.

Key people involved in different conferencing applications - especially the conference moderators (see section 6.5 below) should be networked together within a conference of their own, where they can share and evaluate their experiences and ideas. At the UK Open University, the part-time tutors' private conference on CoSy has been very valuable in this respect.

A variety of incitation techniques can be deployed to attract new users into a conferencing system once there is a core of existing activity - including a number of useful and interesting open public conferences - which they can join. Note that it is probably a mistake to promote widely an entirely new system where there is nothing to see - it is far better to let the enthusiasts and early adopters get the system going and seed it with interesting conferences first.

Techniques to attract in the more cautious beginners can include:
- notices about interesting new conferences which appear automatically when users log on to their computer system
- face-to-face training and induction sessions, where novices can meet experienced users, discuss the various applications of conferencing, and gain some initial hands-on experience
- the inclusion of useful and interesting information that is only available on the conferencing system
- the integration of conferencing with conventional activities (eg asking students to put follow-up questions after lectures into special conferences on the system, say from terminals in the library, which the lecturer then answers in the computer conference)
- an electronic architecture for the system built around already familiar metaphors (eg the *cafe* and *library* on the Connected Education program, the DT200 *electronic campus* at the Open University, DrugCorp's *coffee break* conference etc)
- the dissemination of interesting and useful sequences of conference discussions through more traditional means - eg edited transcripts of conference segments published as printed reports (see Section 3.3, on Shell International's use of conferencing).
- provision of a pool of modems, connector cables, and comms software which can be loaned to staff who have PC's at home, but want to try out the system for themselves before going ahead and purchasing a modem of their own.

One particularly difficult issue in the introduction of new users to a conferencing system, especially at the present time when use of CMC technologies is very much in a transitional phase, is the multiplicity of different CMC systems to which people have access. Most regular users of a university electronic mail system will resent being asked to log on to yet another system unless there is a very convincing argument that the benefits will outweigh the extra effort. In many cases, the argument must be based on the advantages of *conferencing* over *electronic mail* - namely the use of CMC for group work and collaborative activities.

The issue of the multiplicity of different systems currently available needs careful attention if it is not to result in a fragmentation of different users on different systems, each set failing to communicate with the others. Such fragmentation has already arisen at the British Open University central campus, with different groups using CoSy, VaxNotes, VMS mail, InterMail, and so on. Experience suggests that when people have got used to a particular CMC system, they then become reluctant to change to another one, or to add a new system to their repertoire. The resulting splitting up of the user base inevitably leads to an impoverishment of the social environment of any one system, as the number of users per system is far smaller than it would be otherwise.

6.5. Conference Moderation

Probably the single most critical factor determining the successful adoption (or conversely, the failure) of computer conferencing is the quality of conference moderation. Nearly every study of computer conferencing applications stresses the importance which must be attached to the recruitment, training, and support of good conference moderators.

Conference moderation is a time-consuming and skilled activity, for it involves:

- the initial setting up and configuration of a conference
- the encouragement of participation through careful commenting on early messages, and conversion of 'lurkers' into active contributors
- the negotiation of goals and timelines for the conference
- the setting up of branches and new topics as the discussions progress
- the nurturing of group collaborative processes amongst the conference participants
- ensuring that adequate responses and reactions are given to all relevant contributions
- the de-fusing of any destructive conflicts that may arise, and the proper handling of irrelevant or anti-social messages from participants
- the achievement of satisfactory outcomes to the conference, and the closing down of the conference at the appropriate time
- carrying out any necessary follow-up activity (eg archiving of the conference, publication of a report based on an edited conference transcript etc)
- contributing to the overall development of the use of conferencing, by, for example, exchanging views and experiences with other conference moderators on the system.

Many of these skills have their parallels, of course, in more traditional roles (ie those of committee chair, seminar leader, or *animateur*), but the text-based, asynchronous nature of computer conferencing places entirely new demands on the moderator, for which proper training and familiarisation is needed.

Sufficient time must also be set aside for conference moderation: not just actual on-line time, but the time needed for all the associated off-line activities. These include the reading of contributions off-line, the preparation of conference comments, maybe the drafting of private email messages to individual participants, the monitoring of partipants' status, the editing of the final conference transcript, and so on. Moderating can also generate other, non-CMC activities, such as the organisation of group face-to-face meetings with participants, or telephone calls to individuals to follow up points which need such contact. It is unreasonable to expect that staff who take on the moderator tasks can do this in addition to their existing duties, so the effective implementation of conferencing may well require re-scheduling or re-allocation of other administrative or teaching tasks.

Recommended Reading

We would recommend the following resource documents to anyone particularly interested in finding out more about different academic and administrative applications of CMC and/or to anyone charged with implementing and managing the use of CMC within the academic environment:

• **Foster, D.L. (1985) *Educator's Guide to Conferencing : Using Computers*, Austin , Texas, Southwest Educational Development Laboratory, 72pp**

This guide introduces educators to computer conferencing. It includes the following sections:

- What is Computer Conferencing? / Common Applications / The benefits of Computer Conferencing / Current Educational Uses / Electronic Courses / What you need to Hold a Computer Conference On-line / Quick Guide to Computer Conferencing

• **University of Guelph (1987), *The Proceedings of the Second Guelph Symposium on Computer Conferencing, June, 1987*, University of Guelph, Ontario, 325 pp**

This contains 35 papers and abstracts on CMC, organised into seven sections:

- Distance and Adult Education / Socio-Psychological Issues / Computer Conferencing Applications / General Educational Issues / Electronic Conferencing and Beyond / Electronic Message Interchange / Research Applications of Computer Conferencing

• **Canadian Journal of Educational Communication (1987), *Special Issue: Computer-Mediated Communication*, vol 16, no 2, Spring 1987, 191 pp**

This special issue of the CJEC contains the following papers:

- Group Problem-Solving via Computer Conferencing: the Realisable Potential (Don Beckwith), Educational Applications of Computer Conferencing (Elaine McCreary and Judith Van Duren), Teaching and Learning on-Line: Issues in Computer-Mediated Graduate Courses (Linda Harasim), Towards a Third Generation Distributed Conferencing System (Roger Hart), Introducing Computer-Mediated Communication into a Distance Education System (Tony Kaye), Emancipative Educational Technology (Gary Boyd)

• **Mason, R.D. and Kaye , A.R. (eds) (1989), *Mindweave: Communication, Computers, and Distance Education*, Oxford, Pergamon Press, 273 pp**

This book is based on papers presented at the first International Conference on *Computer-Mediated Communication and Distance Education*, held at the Open University, England, in October 1988. It contains 11 principal chapters, and a further 20 short papers. It is divided into three parts;

- Part 1: Themes and Issues (8 chapters)
- Part 2: Computer Conferencing and Mass Distance Education (3 chapters evaluating the use of CMC at the British Open University)
- Part 3 : Resource File (20 papers on specific applications of CMC, and on reflections on its use as an educational medium).

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